Introduction

First, I want to say that I have no vested interest in Tamm, and, therefore, I don't feel obliged to either defend or condemn it. Second, my knowledge of Tamm is based on being a frequent user of the model and having the opportunity to discuss it with Darius' Adams, Richard Haynes, and Dwight Hair over the last few years.

In the limited time available I don't intend to get into the technical details of Tamm. I would suggest that if you want the details you read Forest Science Monograph 22 which was published by Richard and Darius in 1980. If you still want to know more, the best thing to do is call them up.

Instead, I intend to cover four areas which I hope will help you understand Tamm and its implications. First, I will explain in general terms what Tamm is. Second, I want to give you my thoughts on why it is important to be knowledgeable about Tamm. Third, I will give you my opinions about the reliability of the Tamm results. And, finally, I will discuss some of the research underway to improve Tamm.

What is Tamm?

To quote from Monograph 22, Tamm is "a spatial model of North American softwood lumber, plywood, and stumpage markets designed to provide long-range projections of price, consumption, and production trends." I normally describe Tamm as an equilibrium market model for softwood lumber, plywood, and stumpage. But the best way to describe Tamm is to mention a few of its key features. These are:

1. It has two major sectors:
   a. Final products; and,
   b. Stumpage.
(2) It is regional:
   (a) Nine supply regions, including Canada; and
   (b) Six demand regions.

(3) It is a softwood model.

(4) It is a lumber and plywood model.

(5) It has several exogenously determined variables, including:
   (a) Demands for woodpulp, fuelwood, and miscellaneous products, although these elements are considered in the stumpage sector;
   (b) Imports and exports, except for Canadian plywood and lumber imports;
   (c) Northeast and North Central regions lumber and plywood production;
   (d) Public stumpage supply;
   (e) National demand;
   (f) Production costs; and,
   (g) Overrun factors.

(6) It is an annual model.

(7) Its timber projection system is basically TRAS.

(8) It does not distinguish between pulpwood and sawtimber.

(9) It reaches solution when:
   (a) Net revenue is maximized for the producing regions; and,
   (b) Product transportation costs are minimized.

(10) It simultaneously solves the stumpage and product markets.

(11) It is linked to an equilibrium hardwood model in terms of an accounting mechanism to determine total softwood/
hardwood stumpage mixes and requirements, but the linkage is not a direct econometric linkage.

So, generally, that is Tamm. Its most significant improvement, compared to the Forest Service's traditional "gap" methodology, is the incorporation of price-sensitivity into the analysis. I think its second most significant improvement is that it provides the ability to rapidly analyze alternative assumptions and policies.

So, enough about what Tamm is; and, as I said earlier, if you want the details, read Monograph 22.

Why is Tamm Important

From my perspective, the answer to why is Tamm important is rather simple. It is being used by the Forest Service to evaluate and guide formulation of national and regional timber policies. This acceptance by the Forest Service means that Tamm must be understood by those affected by, or trying to affect, national timber policies. That's why you should also be concerned about Tamm.

I am not saying that Tamm will be with us forever; but, for the foreseeable future, it is the only ball game in town. I make this statement because I see the Forest Service directing major research efforts to the improvement and continuation of Tamm, not to its replacement with some alternative model.

How Reliable is Tamm?

Now let's turn to what is suppose to be the main topic of this talk, "How reliable are Tamm results?" At NFPA we have evaluated approximately 25 different runs of Tamm in an effort to determine its strengths and weaknesses. These runs include most of the runs made by the Forest Service for the 1980 RPA, as well as several additional NFPA and Forest Service runs.

All of the runs I have evaluated to date have dealt with alternative supply levels. Only very limited work has been done to change the demand side assumptions, and I have not yet seen the results of this work. However, given the times we are now in, I would expect a considerable number of alternative demand evaluations will be made over the next year or two.

I am sure you are all familiar with the results of the 1980 RPA Assessment. The traditional "gap" analysis showed domestic demand for softwoods increasing substantially more than domestic supply. Even with a large increase in imports, a gap was still
shown to exist. The implication, of course, is rising prices will close the gap. The TAMS Assessment run essentially showed what kinds of price rises would be necessary to close the gap. The result was 2.5 to 3.0 percent annual real stumpage price increases in all regions except the North and Pacific Coast-Westsie regions, which were slightly under 2 percent. And, as would be expected, the equilibrium solution fell between the projected gap demand and supply.

Another important aspect of the results was that both the gap and TAMS shifted the increases in timber removals mainly to the South. This shift occurs at the expense of the West. Another significant result is the shift from softwoods to hardwoods projected by the Forest Service. This shift occurs because of the projected softwood shortage and is driven by the need for pulpwood to meet long-run fiber demand, not solid wood product demand.

So, are the results reliable? The answer is, "Yes and no." On the positive side, one can argue that the model does provide logical results. For example, when timber production is increased, stumpage prices decline. Also, one could argue that the strength of long-run pulp demand relative to solid wood product demand, and the growth of the southern industry relative to the western industry are logical.

On the negative side, however, there are a lot of problems with the Forest Service analyses. Some of the major problems are:

(1) The demand projections are too high, especially for housing. These housing projections are high for several reasons, including, inadequate consideration of the affordability issue, optimistic birth rate assumptions, optimistic conversion and removal rates, and optimistic assumptions about house sizes and the housing mix.

(2) The projections of exports are too low. Part of the problem in this case results from not considering price impacts on exports and part results from optimistic domestic demand projections which implies there will be no incentive to export.

(3) The ability of Canada to compete in U.S. markets appears to have been underestimated. This is probably due, in part, to inaccurate assumptions about exchange rates.
(4) The mill recovery and utilization factors appear too conservative. While this is a fruitful area for research, I believe the general consensus in the industry is that efficiency improvements will be higher than projected by the Forest Service.

(5) The capacity adjustments in the model appear to be suspect. Part of this may be do to the miscalculation of true profit margins and part may be due to inadequate consideration of capital available for investment in new capacity.

(6) The affect of chip markets has not been included in the model. This is especially critical in determining profit margins which is a key driver in the solution.

(7) As mentioned earlier, the pulpwood and sawtimber markets are not separated in the model. This tends to inflate the price impacts projected by the model since, in the long run, pulpwood demand is what is driving sawtimber prices.

(8) As also mentioned, public stumpage markets are exogenous to the model. The industry believes public harvests should be more sensitive to the market, and, of course, this is one of the key issues of NFMA planning.

(9) The timber growth and supply projections of the Forest Service are low. This is a key concern, as the Forest Service has a proven track record of underestimating supply. The problem appears to lie in the TRAS model and the inability to adequately consider management levels and trends in the projections. The Forest Service is now in the process of developing a replacement for TRAS. However, I am still concerned that even after the model is developed the necessary information and relationships to drive the model will still be lacking, especially for nonindustrial private lands. This seems to be a very needed piece of research which southern forest economists should help supply.

As you can see from my list of problems with the Forest Service projections, some of the problems relate to TAMM and some relate to assumptions and inputs to TAMM. For example, the first four problems I listed are associated more with external assumptions than with the internal workings of TAMM. Even some of the remaining problems, like national forest harvests, are due as much to external decisions on how such harvests are to be treated in the model as they are to any modeling deficiencies. It think
it is important to remember that Tamm is only a part of the overall analytical system the Forest Service uses. One can not just isolate Tamm as the only thing controlling the projections.

In a nutshell, I would summarize the outlook for wood products and timber relative to the Forest Service projections as:

1. Demand will be lower, especially for solid wood products.
2. Supply will be higher.
3. Both relative product and stumpage prices will be lower.
4. Exports will be higher.
5. The shift from softwoods to hardwoods will not be as dramatic.
6. The projected growth of the southern industry will not be as dramatic.
7. The decline of the western industry will not be a dramatic, if it occurs at all.
8. Fiber demand will be the long-run demand driver as projected by the Forest Service, not solid wood products.

Improving Tamm

As I mentioned, considerable research is underway to improve Tamm. Some of the major improvements are:

1. To better integrate and model the national demand drivers, such as housing starts, GNP, and income. This will enable easier sensitivity testing of these drivers and, hopefully, lead to more realistic projections.
2. To develop a pulp and paper sector to Tamm.
3. To develop a wood-for-energy sector.
4. To better model Canada by improving the data bases for Canada, as well as more regional sensitivity.
5. To develop a price-sensitive export sector in Tamm for Alaska and Japan and possibly for Western Europe.
(6) To utilize updated survey data which may make a significant difference in some regions such as the westside of Washington and Oregon.

(7) To replace TRAS with a new inventory projection model now being called TRIM.

(8) To develop an improved hardwood model with can be econometrically linked to Tamm.

(9) To update the timber investment opportunity data jointly developed by the industry and the Forest Service.

(10) To reevaluate the supply/demand equations, capacity adjustors, and technological change assumptions used in Tamm.

As you can see, there is a lot of work underway to improve the analytical system. This research is a prime example of the present Forest Service commitment to Tamm as a useful analytical tool for the foreseeable future.

Summary

In summary, I believe the right question to ask is not "Is Tamm reliable?" but rather "Are the Forest Service projections reliable?" And my answer is generally no. I believe the Forest Service projects too high a demand and too low a supply. But the reason this result occurs is not all Tamm's fault. One must also consider the assumptions and data used as input to Tamm.

As I said when I began, I don't feel I am biased about Tamm. Just because I have talked mostly about what is wrong with Tamm, I don't want to imply that Tamm is not useful. I find Tamm very useful and, in my opinion, a substantial improvement over the traditional gap analysis. I also believe that Tamm will get better and better as additional research yields results.

Finally, I don't want you to conclude from my remarks that a timber surplus is on the horizon because I said the Forest Service is projecting demand too high and supply too low. I am not saying that the gap has disappeared, but rather that the gap may be smaller over the long run. I think the Forest Service will likely come to the same conclusion in the next RPA Assessment.